Major Stormwater Management Plan
(Major SWMP)
For
Pine Valley/Sanders TPM
TPM20765/ER 03-15-006

Preparation/Revision Date:
May 21, 2009/April 27, 2010

Prepared for:

James Sanders, Sr.
P.O. Box 232
Brawley, CA 92227
760/344-2310

Prepared by:

William A. Snipes, P.E.
Snipes-Dye Associates
8348 Center Drive, Suite G
La Mesa, CA 91942-2910
619/697-9234
bill@snipesdye.com

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan have been prepared under the direction of the following Registered Civil Engineer and meet the requirements of Regional Water Quality Control Board Order R9-2007-0001 and subsequent amendments.

4/28/10

William A. Snipes, RCE 50477 Date

The Major Stormwater Management Plan (Major SWMP) must be completed in its entirety and accompany applications to the County for a permit or approval associated with certain types of development projects. To determine whether your project is required to submit a Major or Minor SWMP, please reference the County's Stormwater Intake Form for Development Projects.

Project Name:	Pine Valley/Sanders TPM
Project Location:	Old Highway 80, Pine Valley
Permit Number (Land Development Projects):	TPM20765/ER 03-15-006
Work Authorization Number (**CIP only**):	
Applicant:	James Sanders, Sr.
Applicant's Address:	P.O. Box 232, Brawley, CA 92227
Plan Prepared By (*Leave blank if same as applicant*):	Snipes-Dye Associates
Preparer's Address:	See Sheet 1
Date:	May 21, 2009

The County of San Diego Watershed Protection, Storm Water Management, and Discharge Control Ordinance (WPO) (Ordinance No. 9926) requires all applications for a permit or approval associated with a Land Disturbance Activity to be accompanied by a Storm Water Management Plan (SWMP) (section 67.806.b). The purpose of the SWMP is to describe how the project will minimize the short and long-term impacts on receiving water quality. Projects that meet the criteria for a priority development project are required to prepare a Major SWMP.

Since the SWMP is a living document, revisions may be necessary during various stages of approval by the County. Please provide the approval information requested below.

Project Stages	Does the SWMP need revisions?		If YES, Provide Revision Date
	YES	NO	

Instructions for a Major SWMP can be downloaded at
http://www.sdcounty.ca.gov/dpw/watersheds/susmp/susmp.html

Completion of the following checklists and attachments will fulfill the requirements of a Major SWMP for the project listed above.

STEP 1

PRIORITY DEVELOPMENT PROJECT DETERMINATION

TABLE 1: IS THE PROJECT IN ANY OF THESE CATEGORIES?

Yes ☐	No ■	A	**Housing subdivisions of 10 or more dwelling units.** Examples: single-family homes, multi-family homes, condominiums, and apartments.
Yes ☐	No ■	B	**Commercial—greater than one acre.** Any development other than heavy industry or residential. Examples: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities.
Yes ☐	No ■	C	**Heavy industry—greater than one acre.** Examples: manufacturing plants, food processing plants, metal working facilities, printing plants, and fleet storage areas (bus, truck, etc.).
Yes ☐	No ■	D	**Automotive repair shops.** A facility categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.
Yes ☐	No ■	E	**Restaurants.** Any facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirements and hydromodification requirements.
Yes ■	No ☐	F	**Hillside development greater than 5,000 square feet.** Any development that creates 5,000 square feet of impervious surface and is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.
Yes ☐	No ■	G	**Environmentally Sensitive Areas (ESAs).** All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.
Yes ☐	No ■	H	**Parking lots 5,000 square feet or more** or with 15 or more parking spaces and potentially exposed to urban runoff.
Yes ■	No ☐	I	**Street, roads, highways, and freeways.** Any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
Yes ☐	No ■	J	**Retail Gasoline Outlets (RGOs)** that are: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

To use the table, review each definition A through K. If any of the definitions match, the project is a Priority Development Project. Note some thresholds are defined by square footage of impervious area created; others by the total area of the development. Please see special requirements for previously developed sites and project exemptions on page 6 of the County SUSMP.

STEP 2

PROJECT STORMWATER QUALITY DETERMINATION

Total Project Site Area __32.36__ (Acres or ft^2)

Estimated amount of disturbed acreage: ___5___ (Acres or ft^2)
(If >1 acre, you must also provide a WDID number from the SWRCB) WDID: __N/A__

Complete A through C and the calculations below to determine the amount of impervious surface on your project before and after construction.

A. Total size of project site: __32.36__ (Acres or ft^2)

B. Total impervious area (including roof tops) before construction _0.0__ (Acres or ft^2)

C. Total impervious area (including roof tops) after construction __1.5__(Acres or ft^2)

Calculate percent impervious before construction: B/A = __0__%
Calculate percent impervious after construction: C/A = __4.6__%

Please provide detailed descriptions regarding the following questions:

TABLE 2: PROJECT SPECIFIC STORMWATER ANALYSIS

1.	Please provide a brief description of the project.
The proposed project is to subdivide the 32.36 acre property into r parcels ranging in size from 7.13 acres to 9.44 acres gross area. The proposed parcels shall be served by a private road.	
2.	Describe the current and proposed zoning and land use designation.
The current and proposed zoning is rural residential. The general plan designation in No. 1 – Residential.	
3.	Describe the pre-project and post-project topography of the project. (Show on Plan)
The property slopes northwesterly towards the valley. The average slope of the property is slightly greater than 25%. The only change to the topography with the development of the site will be for 4 building pads to be located on each parcel.	
4.	Describe the soil classification, permeability, erodibility, and depth to groundwater for LID and Treatment BMP consideration. (Show on Plan) If infiltration BMPs are proposed, a Geotechnical Engineer must certify infiltration BMPs in Attachment E.

The site consists of 2 soil types, AcG (Acid igneous rock land) that is located on the upper portion of the project site and BbG (Bancas stony loam) that is located on the lower easterly portion of the site where the majority of the development will occur. AcG is a Type D soil and BbG is a Type C soil. This information is provided by the SCS soil maps of 1973. According to the above information both soils have a moderate level of erodibility. The site had percolation rates done and the rates were extremely high so the permeability was very good for the lower portion of the site. The depth to groundwater was also greater than 20 feet which shall allow for storm water to infiltrate into the soil.	
5.	Describe if contaminated or hazardous soils are within the project area. (Show on Plan)
There are no known contaminated or hazardous soils within the project site.	
6.	Describe the existing site drainage and natural hydrologic features. (Show on Plan).
The pre-development and post-development drainage conditions are identical. The site will sheet flow northwesterly to 7 different culverts crossing under Old Highway 80.	
7.	Describe site features and conditions that constrain, or provide opportunities for stormwater control, such as LID features.
The natural swales on the site are excellent places for treatment of runoff from the road.	
8.	Is this project within the environmentally sensitive areas as defined on the maps in Appendix A of the *County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects?*
~~Yes~~	No
9.	Is this an emergency project?
~~Yes~~	No

CHANNELS & DRAINAGES

Complete the following checklist to determine if the project includes work in channels.

TABLE 3: PROJECT SPECIFIC STORMWATER ANALYSIS

No.	CRITERIA	YES	NO	N/A	COMMENTS
1.	Will the project include work in channels?		X		If YES go to 2 If NO go to 13.
2.	Will the project increase velocity or volume of downstream flow?		X		If YES go to 6.
3.	Will the project discharge to unlined channels?	X			If YES go to. 6.
4.	Will the project increase potential sediment load of downstream flow?		X		If YES go to 6.
5.	Will the project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability?		X		If YES go to 8.
6.	Review channel lining materials and design for stream bank erosion.			X	Continue to 7.
7.	Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity.	X			Continue to 8.
8.	Include, where appropriate, energy dissipation devices at culverts.	X			Continue to 9.
9.	Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour.	X			Continue to 10.
10.	Include, if appropriate, detention facilities to reduce peak discharges.			X	Continue to 11.
11.	"Hardening" natural downstream areas to prevent erosion is not an acceptable technique for protecting channel slopes, unless pre-development conditions are determined to be so erosive that hardening would be required even in the absence of the proposed development.			X	Continue to 12.
12.	Provide other design principles that are comparable and equally effective.			X	Continue to 13.
13.	End				

TEMPORARY CONSTRUCTION BMPS

Please check the construction BMPs that may be implemented during construction of the project. The applicant will be responsible for the placement and maintenance of the BMPs incorporated into the final project design.

X Silt Fence

X Fiber Rolls

Street Sweeping and Vacuuming

X Storm Drain Inlet Protection

X Stockpile Management

X Solid Waste Management

X Stabilized Construction Entrance/Exit

Dewatering Operations

X Vehicle and Equipment Maintenance

Desilting Basin

X Gravel Bag Berm

Sandbag Barrier

X Material Delivery and Storage

X Spill Prevention and Control

X Concrete Waste Management

Water Conservation Practices

X Paving and Grinding Operations

Any minor slopes created incidental to construction and not subject to a major or minor grading permit shall be protected by covering with plastic or tarp prior to a rain event, and shall have vegetative cover reestablished within 180 days of completion of the slope and prior to final building approval.

EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

Complete the checklist below to determine if a proposed project will pose an "exceptional threat to water quality," and therefore require Advanced Treatment Best Management Practices during the construction phase.

TABLE 4: EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

No.	CRITERIA	YES	NO	INFORMATION
1.	Is all or part of the proposed project site within 200 feet of waters named on the Clean Water Act (CWA) Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity? Current 303d list may be obtained from the following site: http://www.swrcb.ca.gov/tmdl/docs/303dlists2006/approved/r9_06_303d_reqtmdls.pdf	X		If YES, continue to 2. If NO, go to 5.
2.	Will the project disturb more than 5 acres, including all phases of the development?		X	If YES, continue to 3. If NO, go to 5.
3.	Will the project disturb slopes that are steeper than 4:1 (horizontal: vertical) with at least 10 feet of relief, and that drain toward the 303(d) listed receiving water for sedimentation and/or turbidity?			If YES, continue to 4. If NO, go to 5.
4.	Will the project disturb soils with a predominance of USDA-NRCS Erosion factors k_f greater than or equal to 0.4?			If YES, continue to 6. If NO, go to 5.
5.	**Project is not required to use Advanced Treatment BMPs.**			Document for Project Files by referencing this checklist.
6.	Project poses an "exceptional threat to water quality" and is required to use Advanced Treatment BMPs.			Advanced Treatment BMPs must be consistent with WPO section 67.811(b)(20)(D) performance criteria

Exemption potentially available for projects that require advanced treatment: Project proponent may perform a Revised Universal Soil Loss Equation, Version 2 (RUSLE 2), Modified Universal Soil Loss Equation (MUSLE), or similar analysis that shows to the County official's satisfaction that advanced treatment is not required

STEP 3

HYDROMODIFICATION DETERMINATION

The following questions provide a guide to collecting information relevant to hydromodification management issues.

TABLE 5: HYDROMODIFICATION DETERMINATION

	QUESTIONS	YES	NO	Information
1.	Will the proposed project disturb 50 or more acres of land? (Including all phases of development)		X	If YES, continue to 2. If NO, go to 6.
2.	Would the project site discharge directly into channels that are concrete-lined or significantly hardened such as with rip-rap, sackcrete, etc, downstream to their outfall into bays or the ocean?			If NO, continue to 3. If YES, go to 6.
3.	Would the project site discharge directly into underground storm drains discharging directly to bays or the ocean?			If NO, continue to 4. If YES, go to 6.
4.	Would the project site discharge directly to a channel (lined or un-lined) and the combined impervious surfaces downstream from the project site to discharge at the ocean or bay are 70% or greater?			If NO, continue to 5. If YES, go to 6.
5.	Project is required to manage hydromodification impacts.			Hydromodification Management Required as described in Section 67.812 b(4) of the WPO.
6.	**Project is not required to manage hydromodification impacts.**			Hydromodification Exempt. Keep on file.

An exemption is potentially available for projects that are required (No. 5. in Table 5 above) to manage hydromodification impacts: The project proponent may conduct an independent geomorphic study to determine the project's full hydromodification impact. The study must incorporate sediment transport modeling across the range of geomorphically-significant flows and demonstrate to the County's satisfaction that the project flows and sediment reductions will not detrimentally affect the receiving water to qualify for the exemption.

STEP 4

POLLUTANTS OF CONCERN DETERMINATION

WATERSHED

Please check the watershed(s) for the project.

San Juan 901	Santa Margarita 902	San Luis Rey 903	Carlsbad 904
San Dieguito 905	Penasquitos 906	San Diego 907	Sweetwater 909
Otay 910	X Tijuana 911	Whitewater 719	Clark 720
West Salton 721	Anza Borrego 722	Imperial 723	

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

HYDROLOGIC SUB-AREA NAME AND NUMBER(S)

Number	Name
911.41	Pine HSA

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

SURFACE WATERS that each project discharge point proposes to discharge to. List the impairments identified in Table 7.

SURFACE WATERS (river, creek, stream, etc.)	Hydrologic Unit Basin Number	Impairment(s) listed [303(d) listed waters or waters with established TMDLs]	Distance to Project
Pine Valley Creek	**911.41**	Enterococcus, Phosphorus & Turbidity	0 to 1 mile

http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/r9_06_303d_reqtmdls.pdf

GROUND WATERS

Ground Waters	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Monument	**911.40**	X	X													

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

+ Excepted from Municipal ● Existing Beneficial Use ○ Potential Beneficial Use

PROJECT ANTICIPATED AND POTENTIAL POLLUTANTS

Using Table 6, identify pollutants that are anticipated to be generated from the proposed priority project categories. Pollutants associated with any hazardous material sites that have been remediated or are not threatened by the proposed project are not considered a pollutant of concern.

TABLE 6: ANTICIPATED AND POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE

	General Pollutant Categories								
PDP Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development 1 acre or greater	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Heavy industry /industrial development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Hillside Development >5,000 ft²	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Retail Gasoline Outlets			X	X	X	X	X		
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

PROJECT POLLUTANTS OF CONCERN SUMMARY TABLE

Please summarize the identified project pollutant of concern by checking the appropriate boxes in the table below and list any surface water impairments identified. Pollutants anticipated to be generated by the project, which are also causing impairment of receiving waters, shall be considered the primary pollutants of concern. For projects where no primary pollutants of concern exist, those pollutants identified as anticipated shall be considered secondary pollutants of concern.

TABLE 7: PROJECT POLLUTANTS OF CONCERN

Pollutant Category	Anticipated (X)	Potential (P)	Surface Water Impairments
Sediments	X		Turbidity
Nutrients	X		Phosphorus
Heavy Metals	X		
Organic Compounds	X		
Trash & Debris	X		
Oxygen Demanding Substances	X		
Oil & Grease	X		
Bacteria & Viruses	X		Enterococcus
Pesticides	X		

STEP 5

LID AND SITE DESIGN STRATEGIES

Each numbered item below is a Low Impact Development (LID) requirement of the WPO. Please check the box(s) under each number that best describes the LID BMP(s) and Site Design Strategies selected for this project.

TABLE 8: LID AND SITE DESIGN

1. Conserve natural Areas, Soils, and Vegetation
Preserve well draining soils (Type A or B)
X Preserve Significant Trees
X Preserve critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions.

Other. Description:
2. Minimize Disturbance to Natural Drainages
X Set-back development envelope from drainages
X Restrict heavy construction equipment access to planned green/open space areas
Other. Description:
3. Minimize and Disconnect Impervious Surfaces (see 5)
Clustered Lot Design
X Items checked in 5?
Other. Description:
4. Minimize Soil Compaction
X Restrict heavy construction equipment access to planned green/open space areas
Re-till soils compacted by construction vehicles/equipment
X Collect & re-use upper soil layers of development site containing organic Materials
Other. Description:
5. Drain Runoff from Impervious Surfaces to Pervious Areas
LID Street & Road Design
X Curb-cuts to landscaping
X Rural Swales
Concave Median
Cul-de-sac Landscaping Design
Other. Description:
LID Parking Lot Design-N/A
Permeable Pavements
Curb-cuts to landscaping
Other. Description:
LID Driveway, Sidewalk, Bike-path Design
Permeable Pavements
X Pitch pavements toward landscaping
Other. Description:
LID Building Design
Cisterns & Rain Barrels
X Downspout to swale
Vegetated Roofs
Other. Description:

	LID Landscaping Design
	Soil Amendments
X	Reuse of Native Soils
X	Smart Irrigation Systems
	Street Trees
	Other. Description:
6.	Minimize erosion from slopes
X	Disturb existing slopes only when necessary
X	Minimize cut and fill areas to reduce slope lengths
	Incorporate retaining walls to reduce steepness of slopes or to shorten slopes
	Provide benches or terraces on high cut and fill slopes to reduce concentration of flows
X	Rounding and shaping slopes to reduce concentrated flow
	Collect concentrated flows in stabilized drains and channels
	Other. Description:

STEP 6

SOURCE CONTROL

Please complete the checklist on the following pages to determine Source Control BMPs. Below is instruction on how to use the checklist. (Also see instructions on page 40 of the *SUSMP)*

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.

2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your Source Control Exhibit in Attachment B.

3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in a table in your Project-Specific SUSMP.

Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternatives.

With the development of the site as much of the native vegetation (trees, shrubs and ground cover) shall be retained on the site as possible. Any new vegetation installed over disturbed areas shall also consist of drought tolerant native vegetation. The use of non-native plantings shall be discouraged. The use of pesticides on the vegetation shall be discouraged as well.

If air conditioning is installed on the residences then the condensate drain lines shall discharge to landscape areas adjacent the residence.

Roofing, gutters and trim shall not consist of copper or other unprotected metals.

Sidewalks and patios made up of impervious surfaces shall be swept regularly to prevent the accumulation of litter and debris. The use of impervious pavers or other similar type surfaces shall be encouraged.

Use the format in Table 9 below to summarize the project Source Control BMPs. Incorporate all identified Source Control BMPs in your Source Control Exhibit in Attachment B.

TABLE 9: PROJECT SOURCE CONTROL BMPS

Potential source of runoff pollutants	*Permanent source control BMPs*	*Operational source control BMPs*
Landscape/Outdoor Pesticide Use.	As much existing native vegetation shall remain on the site and any new vegetation will also consist of native plantings.	Existing or proposed landscaping will be using minimal or no pesticides.
Condensate Drain Lines.	If air conditioning is installed on the individual homes then the condensate drains shall discharge to landscape areas.	
Roofing, gutters and trim.	Avoidance of roofing, gutters and trim made of copper or other unprotected metals shall be encouraged.	
Sidewalks		Sidewalks shall be swept regularly to prevent the accumulation of litter and debris.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
☐ **A.** On-site storm drain inlets	☐ Locations of inlets.	☐ Mark all inlets with the words "No Dumping! Flows to Bay" or similar.	☐ Maintain and periodically repaint or replace inlet markings. ☐ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☐ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at ☐ www.cabmphandbooks.com Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
❑ **B.** Interior floor drains and elevator shaft sump pumps		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **C.** Interior parking garages		❑ State that parking garage floor drains will be plumbed to the sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **D1.** Need for future indoor & structural pest control		❑ Note building design features that discourage entry of pests.	❑ Provide Integrated Pest Management information to owners, lessees, and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
X **D2.** Landscape/ Outdoor Pesticide Use Note: Should be consistent with project landscape plan (if applicable).	X Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☐ Show self-retaining landscape areas, if any. ☐ Show stormwater treatment facilities.	State that final landscape plans will accomplish all of the following: ☐ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☐ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☐ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☐ Consider using pest-resistant plants, especially adjacent to hardscape. ☐ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	X Maintain landscaping using minimum or no pesticides. ☐ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☐ Provide IPM information to new owners, lessees and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
❑ **E.** Pools, spas, ponds, decorative fountains, and other water features.	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	❑ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
❑ **F.** Food service	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	❑

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in SUSMP Table and Narrative**	**4** **Operational BMPs—Include in SUSMP Table and Narrative**
❑ **G.** Refuse areas	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
❑ **H.** Industrial processes.	❑ Show process area.	❑ If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
☐ I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ☐ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ☐ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	☐ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of local Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank	☐ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
☐ **J.** Vehicle and Equipment Cleaning	☐ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle /equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the	☐ If a car wash area is not provided, describe measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ☐ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. ☐ Car dealerships and similar may rinse cars with water only. ☐ See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Source Control Exhibit, Attachment B**	**3** **Permanent Controls—List in SUSMP Table and Narrative**	**4** **Operational BMPs—Include in SUSMP Table and Narrative**
❑ **K.** Vehicle/Equipment Repair and Maintenance	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the SUSMP report, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

❑ L. Fuel Dispensing Areas	❑ Fueling areas[1] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[1] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
☐ M. Loading Docks	☐ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited. ☐ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☐ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
☐ **N.** Fire Sprinkler Test Water		☐ Provide a means to drain fire sprinkler test water to the sanitary sewer.	☐ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
O. Miscellaneous Drain or Wash Water ❑ Boiler drain lines **X** Condensate drain lines ❑ Rooftop equipment ❑ Drainage sumps **X** Roofing, gutters, and trim.		❑ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. X Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ❑ Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ❑ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. X Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in SUSMP Table and Narrative**	4 **Operational BMPs—Include in SUSMP Table and Narrative**
X **P.** Plazas, sidewalks, and parking lots.			X Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

STEP 7

LID AND TREATMENT CONTROL SELECTION

A treatment control BMP and/or LID facility must be selected to treat the project pollutants of concern identified in Table 7 "Project Pollutants of Concern". A treatment control facility with a high or medium pollutant removal efficiency for the project's most significant pollutant of concern shall be selected. It is recommended to use the design procedure in Chapter 4 of the SUSMP to meet NPDES permit LID requirements, treatment requirements, and flow control requirements. If your project does not utilize this approach, the project will need to demonstrate compliance with LID, treatment and flow control requirements. Review Chapter 2 "Selection of Stormwater Treatment Facilities" in the SUSMP to assist in determining the appropriate treatment facility for your project.

Will this project be utilizing the unified LID design procedure as described in Chapter 4 of the Local SUSMP? *(If yes, please document in Attachment D following the steps in Chapter 4 of the County SUSMP)*	
Yes	~~No~~
If this project is not utilizing the unified LID design procedure, please describe how the alternative treatment facilities will comply with applicable LID criteria, stormwater treatment criteria, and hydromodification management criteria.	

- Indicate the project pollutants of concern (POCs) from Table 7 in Column 2 below.

TABLE 10: GROUPING OF POTENTIAL POLLUTANTS of Concern (POCs) by fate during stormwater treatment

Pollutant	Check Project Specific POCs	Coarse Sediment and Trash	Pollutants that tend to associate with fine particles during treatment	Pollutants that tend to be dissolved following treatment
Sediment	X	X	X	
Nutrients	X		X	X
Heavy Metals			X	
Organic Compounds			X	
Trash & Debris		X		
Oxygen Demanding			X	
Bacteria	X		X	
Oil & Grease			X	
Pesticides			X	

➢ Indicate the treatment facility(s) chosen for this project in the following table.

TABLE 11: GROUPS OF POLLUTANTS and relative effectiveness of treatment facilities

Pollutants of Concern	Bioretention Facilities (LID)	Settling Basins (Dry Ponds)	Wet Ponds and Constructed Wetlands	Infiltration Facilities or Practices (LID)	Media Filters	Higher-rate biofilters *	Higher-rate media filters*	Trash Racks & Hydro-dynamic Devices	Vegetated Swales
Coarse Sediment and Trash	High	High	High	High	High	High	High	High	High
Pollutants that tend to associate with fine particles during treatment	High	High	High	High	High	Medium	Medium	Low	Medium
Pollutants that tend to be dissolved following treatment	Medium	Low	Medium	High	Low	Low	Low	Low	Low

➢ Please check the box(s) that best describes the Treatment BMP(s) and/or LID BMP selected for this project.

TABLE 12: PROJECT LID AND TC-BMPS

Bioretention Facilites (LID)
☐ Bioretention area
☐ Flow-through Planter
☐ Cistern with Bioretention Facility
Settling Basins (Dry Ponds)
☐ Extended/dry detention basin with grass/vegetated lining
☐ Extended/dry detention basin with impervious lining
Infiltration Facilities or Practices (LID)
☐ Infiltration basin
☐ Dry well
☐ Infiltration trench

Wet Ponds and Constructed Wetlands
☐ Wet pond/basin (permanent pool)
☐ Constructed wetland
Vegetated Swales (LID[1])
X Vegetated Swale
Media Filters
☐ Austin Sand Filter
☐ Delaware Sand Filter
☐ Multi-Chambered Treatment Train (MCTT)
Higher-rate Biofilters
☐ Tree-pit-style unit
☐ Other_____
Higher-rate Media Filters
☐ Vault-based filtration unit with replaceable cartridges
☐ Other_____
Hydrodynamic Separator Systems
☐ Swirl Concentrator
☐ Cyclone Separator
Trash Racks
☐ Catch Basin Insert
☐ Catch Basin Insert w/ Hydrocarbon boom
☐ Other_____
Self-Treating or Self-Retaining Areas (LID)
X Pervious Pavements
☐ Vegetated Roofs
☐ Other_____

[1] Must be designed per SUSMP "Vegetated Swales" design criteria for LID credit (p. 65).

For design guidelines and calculations refer to Chapter 4 "Low Impact Development Design Guide" in the SUSMP. Please show all calculations and design sheets for all treatment facilities proposed in Attachment D.

➢ Create a Construction Plan SWMP Checklist for your project.

Instructions on how to fill out table

1. Number and list each measure or BMP you have specified in your SWMP in Columns 1 and Maintenance Category in Column 3 of the table. Leave Column 2 blank.

2. When you submit construction plans, duplicate the table (by photocopy or electronically). Now fill in Column 2, identifying the plan sheets where the BMPs are shown. List all plan sheets on which the BMP appears. This table must be shown on the front sheet of the grading and improvement plans.

Stormwater Treatment Control and LID BMP's			
Description / Type	Sheet	Maintenance Category	Revisions
1. Vegetated Swale	N/A	First	
2. Permeable Paving	N/A	First	

* BMP's approved as part of Stormwater Management Plan (SWMP) dated xx/xx/xx on file with DPW. Any changes to the above BMP's will require SWMP revision and Plan Change approvals.

➢ Please describe why the chosen treatment BMP(s) was selected for this project. For projects utilizing a low performing BMP, please provide a feasibility analysis that demonstrates utilization of a treatment facility with a high or medium removal efficiency ranking is infeasible.

Permeable paving shall be utilized for patios and walkways around the proposed residences. This will allow for infiltration of any pollutants. Roof discharges will be to landscape areas surrounding the residences on the pad and to the naturally vegetated areas adjacent to the pad. Runoff from driveways will be routed to vegetated areas and swales adjacent to the driveways. The runoff from the proposed private road shall be to rural swales adjacent to the road and then ultimately discharge to naturally vegetated swales prior to discharge off of the site. These methods have a High level of effectiveness for sediment, trash & debris. These methods have a Medium level of effectiveness for all the other pollutants of concern, except for nutrients, which has a low level of effectiveness. As most of the existing and proposed vegetation are drought tolerant native plantings there is not a great expectation for the need of fertilizers for the site.

A Treatment BMP must address runoff from developed areas. Please provide the post-construction water quality treatment volume or flow values for the selected project Treatment BMP(s). Guidelines for design calculations are located in Chapter 4 of the County SUSMP. Label outfalls on the BMP map. The Water Quality peak rate of discharge flow (Q_{WQ}) and the Water Quality storage volume (V_{WQ}) is dependent on the type of treatment BMP selected for the project.

Outfall	**Tributary Area (acres)**	**Q_{WQ} (cfs)**	**V_{WQ} (ft^3)**
A	0.35	0.07	N/A
B	0.06	0.01	N/A
C	0.08	0.016	N/A
D	0.20	0.04	N/A
E	0.06	0.01	N/A
F	0.13	0.03	N/A

Qwq = CIA

C = 1.00
I = 0.20
A = Impervious Surface Tributary Area

The drainage outfalls are shown on Attachment D

STEP 8

OPERATION AND MAINTENANCE

- Please check the box that best describes the maintenance mechanism(s) for this project.

TABLE 13: PROJECT BMP CATEGORY

CATEGORY	SELECTED		BMP Description
	YES	NO	
First	X		Vegetated swales for roof, road and driveway runoff and permeable paving
Second[1]		X	
Third[2]		X	
Fourth		X	

Note:

1. A recorded maintenance agreement will be required.
2. Project will be required to establish or be included in a Stormwater Maintenance Assessment District for the long-term maintenance of treatment BMPs.

- Please list all individual LID and Treatment Control BMPs (TC-BMPs) incorporated into project. Please ensure the "BMP Identifier" is consistent with the legend in Attachment C "LID and/or TC-BMP Exhibit". Please attach the record plan sheets upon completion of project and amend the Major SWMP where appropriate. For each type of LID or TC-BMP provide an inspection sheet in Attachment F "Maintenance Plan".

TABLE 14: PROJECT SPECIFIC LID AND TC-BMPS

BMP Identifier*	LID or TC-BMP Type	BMP Pollutant of Concern Efficiency (H,M,L) – Table 11	Final Construction Date *(to be completed by County inspector)*	Final Construction Inspector Name *(to be completed by County inspector)*
VS	Vegetated swale	H, M & L	N/A	N/A
PP	Permeable pavers	H	N/A	N/A
			N/A	N/A

* For location of BMP's, see approved Record Plan dated _XX/XX/XX_, plan (TYPE) sheet _(#)_.

➢ Responsible Party for Long-term Maintenance:

Identify the parties responsible for long-term maintenance of the BMPs identified above and Source Controls specified in Attachment B. Include the appropriate written agreement with the entities responsible for O&M in Attachment F. Please see Chapter 5 "Private Ownership and Maintenance" on page 94 of the County SUSMP for appropriate maintenance mechanisms.

Name: Future property owners
Company Name:
Phone Number:
Street Address:
City/State/Zip:
Email Address:

➢ Funding Source:

Provide the funding source or sources for long-term operation and maintenance of each BMP identified above. By certifying the Major SWMP the applicant is certifying that the funding responsibilities have been addressed and will be transferred to future owners.

The future property owners shall maintain the vegetated swales during regular maintenance of the properties themselves. The non-irrigated vegetated swales occur naturally so the maintenance required shall be to a minimum. The homeowner's on occasion will be required to remove and trash or debris that may find its' way into the system. No funding for this system is required.

ATTACHMENTS

Please include the following attachments.

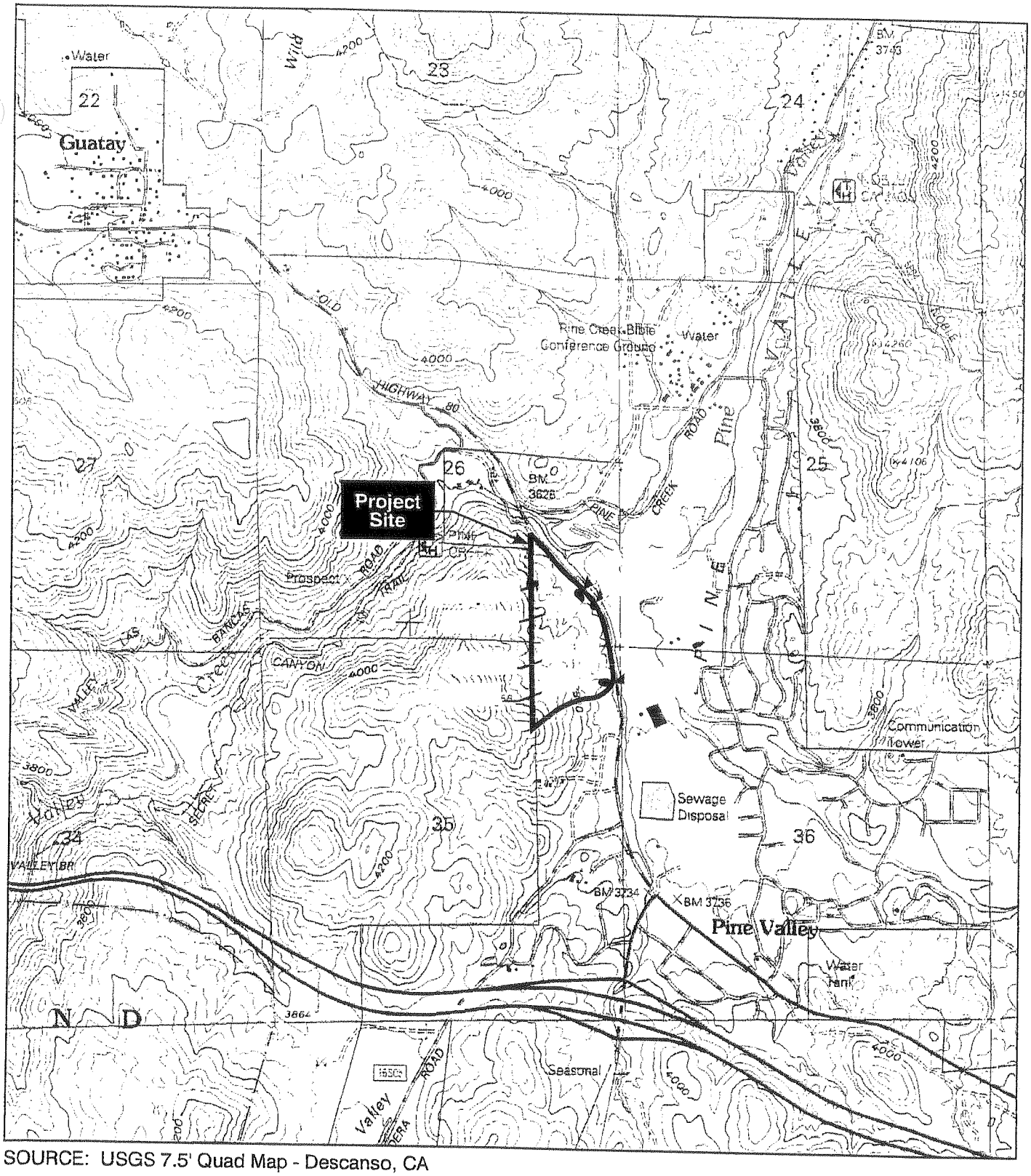
ATTACHMENT		COMPLETED	N/A
A	Project Location Map	X	
B	Source Control Exhibit	X	
C	LID and/or TC-BMP Exhibit	X	

D	Drainage Management Area (DMA) Maps, Sizing Design Calculations and BMP/IMP Design Details	X	
E	Geotechnical Certification Sheet		X
F	Maintenance Plan	X	
G	Tracking Report		X
H	Addendum		X

Note: Attachments B and C may be combined.

ATTACHMENT A

Project Location Map



SOURCE: USGS 7.5' Quad Map - Descanso, CA

ATTACHMENT A

0 1000 2000
FEET

PROJECT LOCATION MAP

ATTACHMENT B

Source Control Exhibit

PINE VALLEY TPM 20765 RPL-2

PRELIMINARY GRADING PLAN
VPM059

PROJECT INFORMATION

OWNER/APPLICANT: JAMES A. SANDERS JR.
P.O. BOX 232
BRAWLEY, CA 92227

DARYL & HEATHER D. DICKERSON ET. AL.
152 W. MCCABE ROAD
EL CENTRO, CA 92243

ASSESSOR'S PARCEL NUMBER: 410-010-07 & 410-030-20

SITE ADDRESS: OLD HIGHWAY 80
PINE VALLEY, CA 91962

TOPOGRAPHY: SAN-LO AERIAL SURVEYS, JOB NO. 12971
DATED 03/28/07

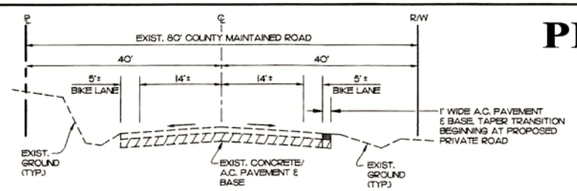
EARTHWORK QUANTITIES:

GRADING

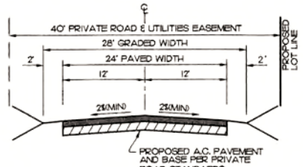
EXCAVATE:	13,200 C.Y.
FILL:	13,200 C.Y.
IMPORT/EXPORT:	0 C.Y.

PRELIMINARY GRADING PLAN NOTE:

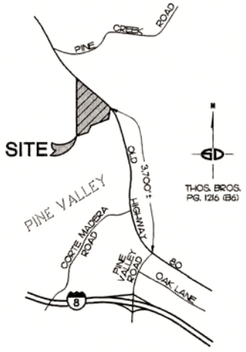
1. THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPEMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE ANY APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN A VALID GRADING PERMIT BEFORE COMMENCING SUCH ACTIVITY.
2. ALL PARCELS TO HAVE 16 FOOT WIDE DRIVEWAYS FROM PRIVATE ROADS TO PADS.



TYPICAL SECTION - OLD HWY 80
NO SCALE

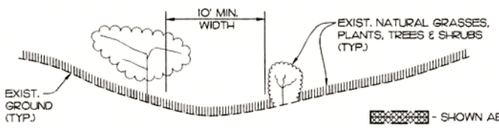


TYPICAL SECTION - PRIVATE ROAD
NO SCALE



VICINITY MAP
NO SCALE

NO BUILDINGS OR STRUCTURES EXIST WITHIN A 15-FOOT PERIMETER FROM THE PROJECT BOUNDARIES.



TYPICAL SECTION - NATURALLY VEGETATED "BIO-FILTER"
NO SCALE

EXISTING NATIVE VEGETATION TO REMAIN

80 0 80 160 240
GRAPHIC SCALE 1" = 80'

ENGINEER OF WORK

Snipes-Dye associates
civil engineers and land surveyors
8348 CENTER DRIVE, STE. G, LA MESA, CA 91942
TELEPHONE (619) 697-9234 FAX (619) 460-2033

WILLIAM A. SNIPES R.C.E. 50477
EXPIRES 06-30-11

REGISTERED PROFESSIONAL ENGINEER WILLIAM A. SNIPES No. 50477 Exp. 06-30-11 CIVIL STATE OF CALIFORNIA

NO.	DATE	REVISION DESCRIPTION	BY
1	8/31/09	ADD STORMWATER BMP ITEMS	SDA

SHEET 1 OF 1 SHEETS
JOB NO. PVCHAI (Z-1)

SNIPES-DYE ASSOCIATES 8348 CENTER DRIVE, SUITE G, LA MESA, CA 91942-2910 (619) 697-9234, FAX (619) 460-2033

SHEET TITLE: PRELIMINARY GRADING PLAN
JOB NAME: PINE VALLEY TPM 20765 RPL-2
DESIGNER: WAS
DRAWN: TCT
CHECKED: WAS
DATE: 9/12/08

ATTACHMENT B - SOURCE CONTROL EXHIBIT

TPM 20765 RPL-2, LOG NO. 03-15-006

S:\SNIPES\PVCHAI\DWG\TENTATIVE PARCEL MAP\GRADING\GP-1.DWG (Z-1)

ATTACHMENT C

LID and/or TC-BMP Exhibit

PINE VALLEY TPM 20765 RPL-2

PRELIMINARY GRADING PLAN
VPM059

PROJECT INFORMATION

OWNER/APPLICANT: JAMES A. SANDERS JR.
P.O. BOX 232
BRAWLEY, CA 92227

DARYL & HEATHER D. DICKERSON ET. AL.
152 W. MCCABE ROAD
EL CENTRO, CA 92243

ASSESSOR'S PARCEL NUMBER: 410-010-07 & 410-030-20

SITE ADDRESS: OLD HIGHWAY 80
PINE VALLEY, CA 91962

TOPOGRAPHY: SAN-LO AERIAL SURVEYS, JOB NO. 12971
DATED 03/28/07

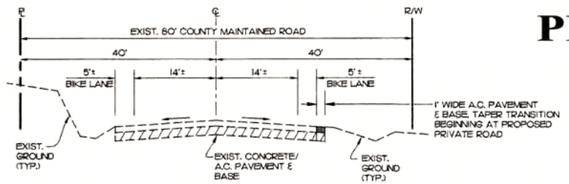
EARTHWORK QUANTITIES:

GRADING

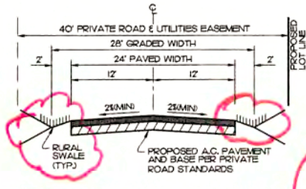
EXCAVATE:	13,200 C.Y.
FILL:	13,200 C.Y.
IMPORT/EXPORT:	0 C.Y.

PRELIMINARY GRADING PLAN NOTE:

1. THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPEMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE ANY APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN A VALID GRADING PERMIT BEFORE COMMENCING SUCH ACTIVITY.
2. ALL PARCELS TO HAVE 16 FOOT WIDE DRIVEWAYS FROM PRIVATE ROADS TO PADS.

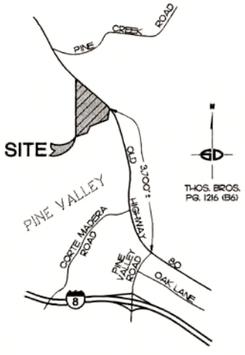


TYPICAL SECTION - OLD HWY 80
NO SCALE

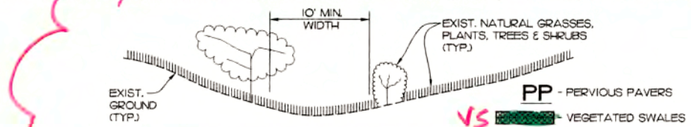


TYPICAL SECTION - PRIVATE ROAD
NO SCALE

NO BUILDINGS OR STRUCTURES EXIST WITHIN A 15-FOOT PERIMETER FROM THE PROJECT BOUNDARIES.



VICINITY MAP
NO SCALE



TYPICAL SECTION - NATURALLY VEGETATED "BIO-FILTER"
NO SCALE

VEGETATED "BIO-FILTERS"		
NO.	LENGTH (FT.)	AVG. SLOPE (%)
A	100	2.0
B	100	2.5
C	100	10
D	120	2.5
E	100	10
F	60	12.5

GRAPHIC SCALE: 1" = 80'

ENGINEER OF WORK

Snipes-Dye associates
civil engineers and land surveyors
8348 CENTER DRIVE, STE. G, LA MESA, CA 91942
TELEPHONE (619) 697-9234 FAX (619) 460-2033

WILLIAM A. SNIPES R.C.E. 50477
EXPIRES 06-30-11

REGISTERED PROFESSIONAL ENGINEER WILLIAM A. SNIPES No. 50477 Exp. 06-30-11 CIVIL STATE OF CALIFORNIA

SHEET 1 OF 1 SHEETS

JOB NO. PVO141 (Z-1)

PRELIMINARY GRADING PLAN
PINE VALLEY TPM
20765 RPL-2

NO.	DATE	BY	REVISION DESCRIPTION
1	6/30/08		MOD. STORMWATER BMP ITEMS

DESIGNED WAS
DRAWN TCT
CHECKED WAS
DATE 9/12/08

SNIPES-DYE ASSOCIATES 8348 CENTER DRIVE, SUITE G, LA MESA, CA 91942 (619) 697-9234, FAX (619) 460-2033

S:\SNIPES\PVO141\DWG\TENTATIVE PARCEL MAP\GRADING\GP-1.DWG (Z-1)

TPM 20765 RPL-2, LOG NO. 03-15-006

ATTACHMENT C - LID TC-BMP EXHIBIT

ATTACHMENT D

Drainage Management Area (DMA) Maps, Sizing Design Calculations and TC-BMP/LID Design Details

PINE VALLEY TPM 20765 RPL-2

PRELIMINARY GRADING PLAN
VPM059

PROJECT INFORMATION

OWNER/APPLICANT: JAMES A. SANDERS JR.
P.O. BOX 232
BRAWLEY, CA 92227

DARYL & HEATHER D. DICKERSON ET. AL.
152 W. MCCABE ROAD
EL CENTRO, CA 92243

ASSESSOR'S PARCEL NUMBER: 410-010-07 & 410-030-20

SITE ADDRESS: OLD HIGHWAY 80
PINE VALLEY, CA 91962

TOPOGRAPHY: SAN-LO AERIAL SURVEYS, JOB NO. 12971
DATED 03/28/07

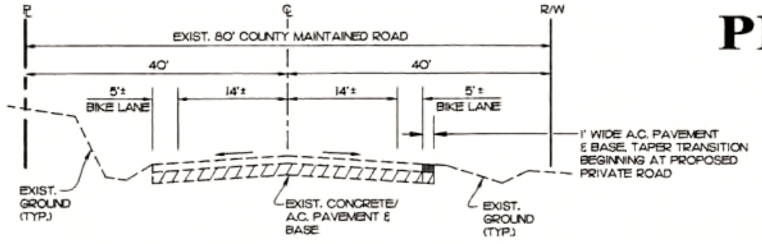
EARTHWORK QUANTITIES:

GRADING

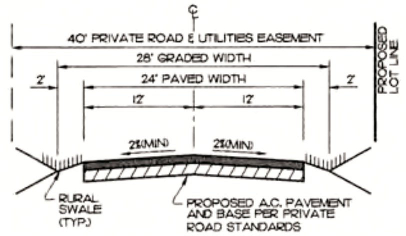
EXCAVATE: 13,200 C.Y.
FILL: 13,200 C.Y.
IMPORT/EXPORT: 0 C.Y.

PRELIMINARY GRADING PLAN NOTE:

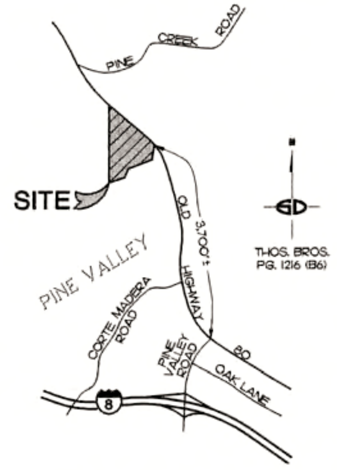
1. THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPEMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE ANY APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN A VALID GRADING PERMIT BEFORE COMMENCING SUCH ACTIVITY.
2. ALL PARCELS TO HAVE 16 FOOT WIDE DRIVEWAYS FROM PRIVATE ROADS TO PADS.



TYPICAL SECTION - OLD HWY 80
NO SCALE

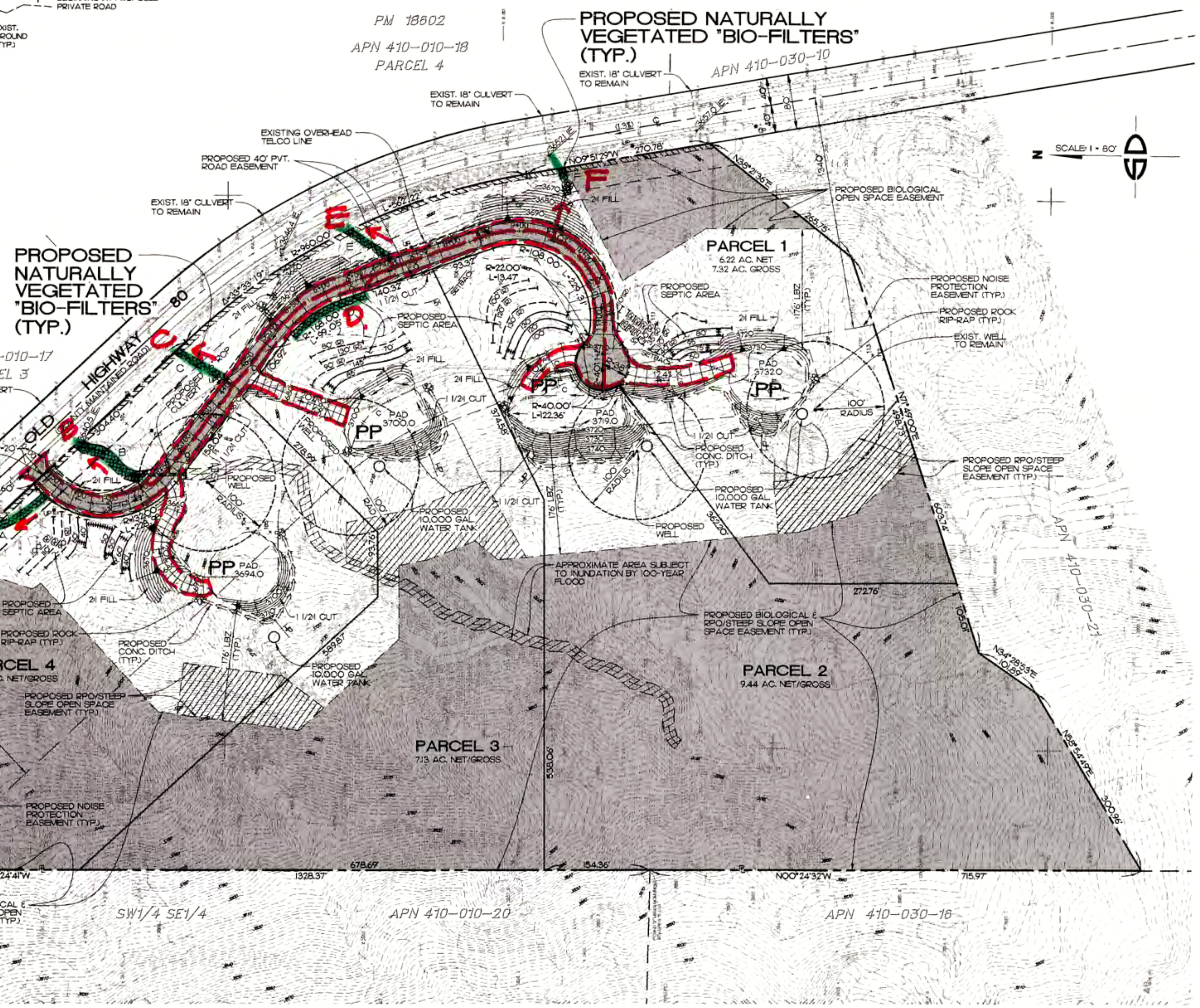


TYPICAL SECTION - PRIVATE ROAD
NO SCALE

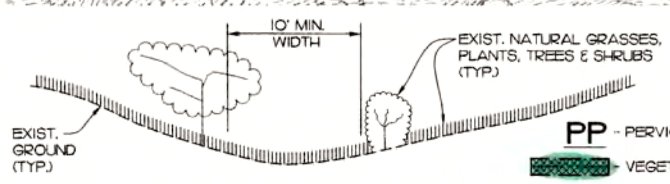


VICINITY MAP
NO SCALE

NO BUILDINGS OR STRUCTURES EXIST WITHIN A 15-FOOT PERIMETER FROM THE PROJECT BOUNDARIES.



PROPOSED NATURALLY VEGETATED "BIO-FILTERS" (TYP.)
PROPOSED NATURALLY VEGETATED "BIO-FILTERS" (TYP.)
PM 18602
APN 410-010-18
PARCEL 4
APN 410-030-10
APN 410-010-17
PARCEL 3
OLD HIGHWAY 80
EXIST. 18" CULVERT TO REMAIN
EXISTING OVERHEAD TELCO LINE
PROPOSED 40' PVT. ROAD EASEMENT
EXIST. 24" CULVERT TO REMAIN
40' WIDE OPENING FOR ACCESS
LIMIT OF BUILDING LINE
PROPOSED BIOLOGICAL OPEN SPACE EASEMENT
PARCEL 1
6.22 AC. NET
7.32 AC. GROSS
PROPOSED NOISE PROTECTION EASEMENT (TYP.)
PROPOSED ROCK RIP-RAP (TYP.)
EXIST. WELL TO REMAIN
PROPOSED SEPTIC AREA
PROPOSED RPO/STEEP SLOPE OPEN SPACE EASEMENT (TYP.)
PROPOSED 10,000 GAL WATER TANK
PROPOSED WELL
PROPOSED CONC. DITCH (TYP.)
APPROXIMATE AREA SUBJECT TO INUNDATION BY 100-YEAR FLOOD
PROPOSED BIOLOGICAL & RPO/STEEP SLOPE OPEN SPACE EASEMENT (TYP.)
PARCEL 2
9.44 AC. NET/GROSS
PARCEL 3
7.13 AC. NET/GROSS
PARCEL 4
8.47 AC. NET/GROSS
APN 410-010-15
PARCEL 1
APN 410-030-21
R.O.S. 6632
NW1/4 SE1/4
APN 410-010-10
SW1/4 SE1/4
APN 410-010-20
APN 410-030-16
A
B
C
D
E
F
PP
SCALE: 1" = 80'



TYPICAL SECTION - NATURALLY VEGETATED "BIO-FILTER"
NO SCALE

PP - PERVIOUS PAVERS
VEGETATED SWALES

GRAPHIC SCALE: 1" = 80'

VEGETATED "BIO-FILTERS"		
NO.	LENGTH (FT.)	AVG. SLOPE (%)
A	100	2.0
B	100	2.5
C	100	10
D	120	2.5
E	100	10
F	60	12.5

ENGINEER OF WORK

Snipes-Dye associates
civil engineers and land surveyors
8348 CENTER DRIVE, STE. G, LA MESA, CA 91942
TELEPHONE (619) 697-9234 FAX (619) 460-2033

WILLIAM A. SNIPES R.C.E. 50477
EXPIRES 06-30-11

PRELIMINARY GRADING PLAN
PINE VALLEY TPM 20765 RPL-2

DESIGNER WAS, DRAWN TCT, CHECKED WAS, DATE 9/2/08

SNIPES-DYE ASSOCIATES 8348 CENTER DRIVE, SUITE G, LA MESA, CA 91942-2910 (619) 697-9234, FAX (619) 460-2033

SHEET 1 OF 1 SHEETS
PV0141 (Z-1)

S:\SNIPES\PV014X\DWG\TENTATIVE PARCEL MAP\GRADING\GP-1.DWG (Z-1)

ATTACHMENT D - DRAINAGE AREA EXHIBIT

FlowSizer.com

OUTFALL A

Updated Open Channel Flow Calculator

Open Channel | Orifice | Weir

Select Channel Shape

Circular | Trapezoidal | Rectangular | Triangular

$$Q = \frac{1.486}{n} AR^{2/3}\sqrt{S}$$

Provide Trapezoidal Chan. Variables

Flow Depth - d(in)	1.3
Manning's N - n(unitless)	0.25
Longitudinal Slope - S(ft/ft)	0.02
Side Slope - Z(ft/ft)	10
Bottom Width - W(ft)	3

Eng. Units	Units	Values
Velocity	ft/s	0.1631
Wetted Perimeter	ft	5.17
Wetted Area	sq ft	1.4424
Hydraulic Radius	ft	0.08545
Calculated Flow	cfs	0.07216

SI. Units	Units	Values
Velocity	m/s	0.04971
Wetted Perimeter	m	1.578
Wetted Area	sq. m	0.04110
Hydraulic Radius	m	0.02605
Calculated Flow	cu-m/s	0.00204

← Y = 0.16

Bookmark/Search this post with:

Comments

COOL!
achristian - 04/07/2010 - 15:09

Хороший сайт :) заглядывайте и ко мне - Скачать фильмы музыку игры :))

FlowSizer.com

OUTFALL B

Updated Open Channel Flow Calculator

Open Channel | Orifice | Weir

Select Channel Shape

Circular | Trapezoidal | Rectangular | Triangular

$$Q = \frac{1.486}{n} AR^{2/3}\sqrt{S}$$

Provide Trapezoidal Chan. Variables

Flow Depth - d(in)	0.4
Manning's N - n(unitless)	0.25
Longitudinal Slope - S(ft/ft)	0.025
Side Slope - Z(ft/ft)	10
Bottom Width - W(ft)	3

Eng. Units	Units	Values
Velocity	ft/s	0.09128
Wetted Perimeter	ft	3.671
Wetted Area	sq ft	0.1111
Hydraulic Radius	ft	0.03027
Calculated Flow	cfs	0.01014

← V=0.09

SI. Units	Units	Values
Velocity	m/s	0.02782
Wetted Perimeter	m	1.119
Wetted Area	sq. m	0.01032
Hydraulic Radius	m	0.00922
Calculated Flow	cu-m/s	0.00028

Bookmark/Search this post with:

Comments

COOL!
achristian - 04/07/2010 - 15:09

Хороший сайт :) заглядывайте и ко мне - Скачать фильмы музыку игры :))

FlowSizer.com

OUTFALL C

Updated Open Channel Flow Calculator

Open Channel | Orifice | Weir

Select Channel Shape

Circular | Trapezoidal | Rectangular | Triangular

$$Q = \frac{1.486}{n} AR^{2/3}\sqrt{S}$$

Provide Trapezoidal Chan. Variables

Flow Depth - d(in)	0.35
Manning's N - n(unitless)	0.25
Longitudinal Slope - S(ft/ft)	0.1
Side Slope - Z(ft/ft)	10
Bottom Width - W(ft)	3

Eng. Units	Units	Values
Velocity	ft/s	0.1682
Wetted Perimeter	ft	7.596
Wetted Area	sq.ft	1.09600
Hydraulic Radius	ft	0.1429
Calculated Flow	cfs	0.01615

← V=0.17

SI. Units	Units	Values
Velocity	m/s	0.05127
Wetted Perimeter	m	1.093
Wetted Area	sq. m	0.00891
Hydraulic Radius	m	0.00815
Calculated Flow	cu-m/s	0.00045

Bookmark/Search this post with:

Comments

COOL!
achristian - 04/07/2010 - 15:09

Хороший сайт :) заглядывайте и ко мне - Скачать фильмы музыку игры :))

FlowSizer.com

OUTFALL D

Updated Open Channel Flow Calculator

Open Channel | Orifice | Weir

Select Channel Shape

Circular | Trapezoidal | Rectangular | Triangular

$$Q = \frac{1.486}{n} AR^{2/3}\sqrt{S}$$

Provide Trapezoidal Chan. Variables

Flow Depth - d(ft)	0.9
Manning's N - n(unitless)	0.25
Longitudinal Slope - S(ft/ft)	0.025
Side Slope - Z(ft/ft)	10
Bottom Width - W(ft)	3

Eng. Units	Units	Values
Velocity	ft/s	0.1479
Wetted Perimeter	ft	19.17
Wetted Area	sq ft	7.281
Hydraulic Radius	ft	0.36241
Calculated Flow	cfs	0.04167

← V=0.15

SI. Units	Units	Values
Velocity	m/s	0.04508
Wetted Perimeter	m	5.844
Wetted Area	sq. m	0.02613
Hydraulic Radius	m	0.01902
Calculated Flow	cu-m/s	0.00117

Bookmark/Search this post with:

Comments

COOL!
achristian - 04/07/2010 - 15:09

Хороший сайт :) заглядывайте и ко мне - Скачать фильмы музыку игры :))

FlowSizer.com

OUTFALL F,

Updated Open Channel Flow Calculator

Open Channel | Orifice | Weir

Select Channel Shape

Circular | Trapezoidal | Rectangular | Triangular

$$Q = \frac{1.486}{n} AR^{2/3}\sqrt{S}$$

Provide Trapezoidal Chan. Variables

Flow Depth - d(in)	0.47
Manning's N - n(unitless)	0.25
Longitudinal Slope - S(ft/ft)	0.125
Side Slope - Z(ft/ft)	10
Bottom Width - W(ft)	3

Eng. Units	Units	Values
Velocity	ft/s	0.2252
Wetted Perimeter	ft	3.777
Wetted Area	sq.ft	1.3270
Hydraulic Radius	ft	0.3513
Calculated Flow	cfs	0.02991

← V = 0.23

SI. Units	Units	Values
Velocity	m/s	0.06864
Wetted Perimeter	m	1.154
Wetted Area	sq. m	0.01234
Hydraulic Radius	m	0.01069
Calculated Flow	cu-m/s	0.00084

Bookmark/Search this post with:

Comments

COOL!

achristian - 04/07/2010 - 15:09

Хороший сайт :) заглядывайте и ко мне - Скачать фильмы музыку игры :))

FlowSizer.com

OUTFALL F_2

Updated Open Channel Flow Calculator

Open Channel | Orifice | Weir

Select Channel Shape

Circular | Trapezoidal | Rectangular | Triangular

$$Q = \frac{1.486}{n} AR^{2/3}\sqrt{S}$$

Provide Trapezoidal Chan. Variables

Flow Depth - d(in)	0.98
Manning's N - n(unitless)	0.25
Longitudinal Slope - S(ft/ft)	0.01
Side Slope - Z(ft/ft)	10
Bottom Width - W(ft)	3

Eng. Units	Units	Values
Velocity	ft/s	0.09821
Wetted Perimeter	ft	4.641
Wetted Area	sq ft	0.3117
Hydraulic Radius	ft	0.06716
Calculated Flow	cfs	0.03061

SI. Units	Units	Values
Velocity	m/s	0.02993
Wetted Perimeter	m	1.415
Wetted Area	sq. m	0.02896
Hydraulic Radius	m	0.02047
Calculated Flow	cu-m/s	0.00086

← V = 0.10

Bookmark/Search this post with:

Comments

COOL!
achristian - 04/07/2010 - 15:09

Хороший сайт :) заглядывайте и ко мне - Скачать фильмы музыку игры :))

SNIPES-DYE ASSOCIATES
8348 CENTER DR #G
LA MESA, CA 91942
(619) 697-9234 FAX (619) 460-2033

JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

OUTFALL A

$V = 0.16$ FPS

$L = 100$ FT

$t = \frac{L}{V} = \frac{100}{0.16} = 625\,s = 10.4$ min

$t = 10.4 > 10$, ∴ OK

OUTFALL B

$V = 0.09$

$L = 100$ FT

$t = \frac{L}{V} = \frac{100}{0.09} = 1111\,s = 18.5$ min

$t = 18.5 > 10$, ∴ OK

OUTFALL C

$V = 0.17$

$L = 100$

$t = \frac{L}{V} = \frac{100}{0.17} = 588\,s = 9.8$ min

$t = 9.8 \approx 10$, ∴ OK

OUTFALL D

$V = 0.15$

$L = 120$

$t = \frac{L}{V} = \frac{120}{0.15} = 800\,s = 13.3$ min

$t = 13.3 > 10$, ∴ OK

SNIPES-DYE ASSOCIATES
8348 CENTER DR #G
LA MESA, CA 91942
(619) 697-9234 FAX (619) 460-2033

JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

OUTFALL E

$V = 0.14$

$L = 100$

$t = \frac{L}{V} = \frac{100}{0.14} = 714\,s = 11.9\,min$

$t = 11.9 > 10$, ∴ OK

OUTFALL F

$V = 0.23$

$L = 60$

$t = \frac{60}{0.23} = 260\,s = 4.3\,min.$

$t = 4.3 < 10$, ∴ NO GOOD

$V = 0.10$

$L = 60$

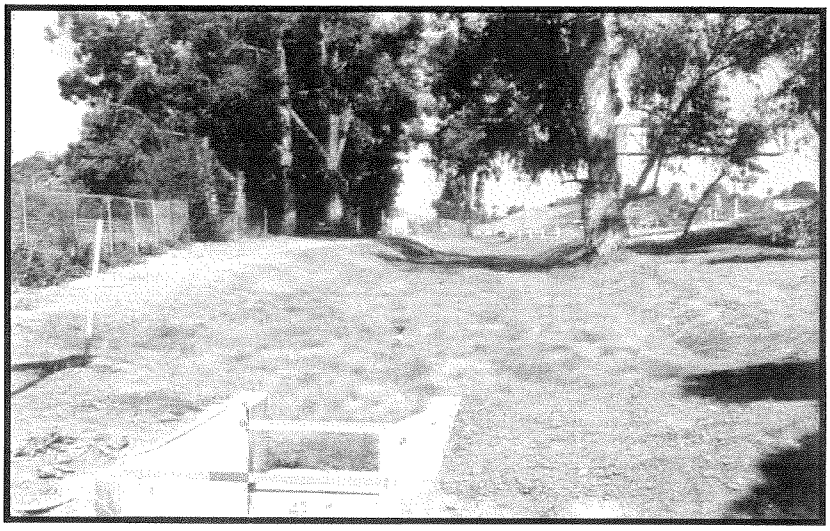
$t = \frac{60}{0.1} = 600\,s = 10\,min$

$t = 10 = 10$, ∴ OK

TO OBTAIN THE 10 MIN. TIME IN THE CHANNEL CHECK DAMS SHALL BE INSTALLED PER TC-30 TO ALLOW THE RUNOFF TO POOL BEHIND EACH CHECK DAM. THIS SHALL APPLY TO OUTFALL F ONLY.

THE PRECISE DETAILS OF THE CHECK DAMS AND THEIR LOCATIONS SHALL BE DETERMINED WITH THE CONSTRUCTION DOCUMENTS TO BE DONE WITH THE FINAL MAP.

Vegetated Swale TC-30



Design Considerations

- Tributary Area
- Area Required
- Slope
- Water Availability

Description

Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems.

Targeted Constituents

☑	Sediment	▲
☑	Nutrients	●
☑	Trash	●
☑	Metals	▲
☑	Bacteria	●
☑	Oil and Grease	▲
☑	Organics	▲

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

California Experience

Caltrans constructed and monitored six vegetated swales in southern California. These swales were generally effective in reducing the volume and mass of pollutants in runoff. Even in the areas where the annual rainfall was only about 10 inches/yr, the vegetation did not require additional irrigation. One factor that strongly affected performance was the presence of large numbers of gophers at most of the sites. The gophers created earthen mounds, destroyed vegetation, and generally reduced the effectiveness of the controls for TSS reduction.

Advantages

- If properly designed, vegetated, and operated, swales can serve as an aesthetic, potentially inexpensive urban development or roadway drainage conveyance measure with significant collateral water quality benefits.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Roadside ditches should be regarded as significant potential swale/buffer strip sites and should be utilized for this purpose whenever possible.

Limitations

- Can be difficult to avoid channelization.
- May not be appropriate for industrial sites or locations where spills may occur
- Grassed swales cannot treat a very large drainage area. Large areas may be divided and treated using multiple swales.
- A thick vegetative cover is needed for these practices to function properly.
- They are impractical in areas with steep topography.
- They are not effective and may even erode when flow velocities are high, if the grass cover is not properly maintained.
- In some places, their use is restricted by law: many local municipalities require curb and gutter systems in residential areas.
- Swales are mores susceptible to failure if not properly maintained than other treatment BMPs.

Design and Sizing Guidelines

- Flow rate based design determined by local requirements or sized so that 85% of the annual runoff volume is discharged at less than the design rainfall intensity.
- Swale should be designed so that the water level does not exceed 2/3rds the height of the grass or 4 inches, which ever is less, at the design treatment rate.
- Longitudinal slopes should not exceed 2.5%
- Trapezoidal channels are normally recommended but other configurations, such as parabolic, can also provide substantial water quality improvement and may be easier to mow than designs with sharp breaks in slope.
- Swales constructed in cut are preferred, or in fill areas that are far enough from an adjacent slope to minimize the potential for gopher damage. Do not use side slopes constructed of fill, which are prone to structural damage by gophers and other burrowing animals.
- A diverse selection of low growing, plants that thrive under the specific site, climatic, and watering conditions should be specified. Vegetation whose growing season corresponds to the wet season are preferred. Drought tolerant vegetation should be considered especially for swales that are not part of a regularly irrigated landscaped area.
- The width of the swale should be determined using Manning's Equation using a value of 0.25 for Manning's n.

Construction/Inspection Considerations

- Include directions in the specifications for use of appropriate fertilizer and soil amendments based on soil properties determined through testing and compared to the needs of the vegetation requirements.
- Install swales at the time of the year when there is a reasonable chance of successful establishment without irrigation; however, it is recognized that rainfall in a given year may not be sufficient and temporary irrigation may be used.
- If sod tiles must be used, they should be placed so that there are no gaps between the tiles; stagger the ends of the tiles to prevent the formation of channels along the swale or strip.
- Use a roller on the sod to ensure that no air pockets form between the sod and the soil.
- Where seeds are used, erosion controls will be necessary to protect seeds for at least 75 days after the first rainfall of the season.

Performance

The literature suggests that vegetated swales represent a practical and potentially effective technique for controlling urban runoff quality. While limited quantitative performance data exists for vegetated swales, it is known that check dams, slight slopes, permeable soils, dense grass cover, increased contact time, and small storm events all contribute to successful pollutant removal by the swale system. Factors decreasing the effectiveness of swales include compacted soils, short runoff contact time, large storm events, frozen ground, short grass heights, steep slopes, and high runoff velocities and discharge rates.

Conventional vegetated swale designs have achieved mixed results in removing particulate pollutants. A study performed by the Nationwide Urban Runoff Program (NURP) monitored three grass swales in the Washington, D.C., area and found no significant improvement in urban runoff quality for the pollutants analyzed. However, the weak performance of these swales was attributed to the high flow velocities in the swales, soil compaction, steep slopes, and short grass height.

Another project in Durham, NC, monitored the performance of a carefully designed artificial swale that received runoff from a commercial parking lot. The project tracked 11 storms and concluded that particulate concentrations of heavy metals (Cu, Pb, Zn, and Cd) were reduced by approximately 50 percent. However, the swale proved largely ineffective for removing soluble nutrients.

The effectiveness of vegetated swales can be enhanced by adding check dams at approximately 17 meter (50 foot) increments along their length (See Figure 1). These dams maximize the retention time within the swale, decrease flow velocities, and promote particulate settling. Finally, the incorporation of vegetated filter strips parallel to the top of the channel banks can help to treat sheet flows entering the swale.

Only 9 studies have been conducted on all grassed channels designed for water quality (Table 1). The data suggest relatively high removal rates for some pollutants, but negative removals for some bacteria, and fair performance for phosphorus.

Table 1 Grassed swale pollutant removal efficiency data							
	Removal Efficiencies (% Removal)						
Study	TSS	TP	TN	NO_3	Metals	Bacteria	Type
Caltrans 2002	77	8	67	66	83-90	-33	dry swales
Goldberg 1993	67.8	4.5	-	31.4	42–62	-100	grassed channel
Seattle Metro and Washington Department of Ecology 1992	60	45	-	-25	2–16	-25	grassed channel
Seattle Metro and Washington Department of Ecology, 1992	83	29	-	-25	46–73	-25	grassed channel
Wang et al., 1981	80	-	-	-	70–80	-	dry swale
Dorman et al., 1989	98	18	-	45	37–81	-	dry swale
Harper, 1988	87	83	84	80	88–90	-	dry swale
Kercher et al., 1983	99	99	99	99	99	-	dry swale
Harper, 1988.	81	17	40	52	37–69	-	wet swale
Koon, 1995	67	39	-	9	-35 to 6	-	wet swale

While it is difficult to distinguish between different designs based on the small amount of available data, grassed channels generally have poorer removal rates than wet and dry swales, although some swales appear to export soluble phosphorus (Harper, 1988; Koon, 1995). It is not clear why swales export bacteria. One explanation is that bacteria thrive in the warm swale soils.

Siting Criteria

The suitability of a swale at a site will depend on land use, size of the area serviced, soil type, slope, imperviousness of the contributing watershed, and dimensions and slope of the swale system (Schueler et al., 1992). In general, swales can be used to serve areas of less than 10 acres, with slopes no greater than 5 %. Use of natural topographic lows is encouraged and natural drainage courses should be regarded as significant local resources to be kept in use (Young et al., 1996).

Selection Criteria (NCTCOG, 1993)

- Comparable performance to wet basins
- Limited to treating a few acres
- Availability of water during dry periods to maintain vegetation
- Sufficient available land area

Research in the Austin area indicates that vegetated controls are effective at removing pollutants even when dormant. Therefore, irrigation is not required to maintain growth during dry periods, but may be necessary only to prevent the vegetation from dying.

The topography of the site should permit the design of a channel with appropriate slope and cross-sectional area. Site topography may also dictate a need for additional structural controls. Recommendations for longitudinal slopes range between 2 and 6 percent. Flatter slopes can be used, if sufficient to provide adequate conveyance. Steep slopes increase flow velocity, decrease detention time, and may require energy dissipating and grade check. Steep slopes also can be managed using a series of check dams to terrace the swale and reduce the slope to within acceptable limits. The use of check dams with swales also promotes infiltration.

Additional Design Guidelines

Most of the design guidelines adopted for swale design specify a minimum hydraulic residence time of 9 minutes. This criterion is based on the results of a single study conducted in Seattle, Washington (Seattle Metro and Washington Department of Ecology, 1992), and is not well supported. Analysis of the data collected in that study indicates that pollutant removal at a residence time of 5 minutes was not significantly different, although there is more variability in that data. Therefore, additional research in the design criteria for swales is needed. Substantial pollutant removal has also been observed for vegetated controls designed solely for conveyance (Barrett et al, 1998); consequently, some flexibility in the design is warranted.

Many design guidelines recommend that grass be frequently mowed to maintain dense coverage near the ground surface. Recent research (Colwell et al., 2000) has shown mowing frequency or grass height has little or no effect on pollutant removal.

Summary of Design Recommendations

1) The swale should have a length that provides a minimum hydraulic residence time of at least 10 minutes. The maximum bottom width should not exceed 10 feet unless a dividing berm is provided. The depth of flow should not exceed 2/3rds the height of the grass at the peak of the water quality design storm intensity. The channel slope should not exceed 2.5%.

2) A design grass height of 6 inches is recommended.

3) Regardless of the recommended detention time, the swale should be not less than 100 feet in length.

4) The width of the swale should be determined using Manning's Equation, at the peak of the design storm, using a Manning's n of 0.25.

5) The swale can be sized as both a treatment facility for the design storm and as a conveyance system to pass the peak hydraulic flows of the 100-year storm if it is located "on-line." The side slopes should be no steeper than 3:1 (H:V).

6) Roadside ditches should be regarded as significant potential swale/buffer strip sites and should be utilized for this purpose whenever possible. If flow is to be introduced through curb cuts, place pavement slightly above the elevation of the vegetated areas. Curb cuts should be at least 12 inches wide to prevent clogging.

7) Swales must be vegetated in order to provide adequate treatment of runoff. It is important to maximize water contact with vegetation and the soil surface. For general purposes, select fine, close-growing, water-resistant grasses. If possible, divert runoff (other than necessary irrigation) during the period of vegetation

establishment. Where runoff diversion is not possible, cover graded and seeded areas with suitable erosion control materials.

Maintenance

The useful life of a vegetated swale system is directly proportional to its maintenance frequency. If properly designed and regularly maintained, vegetated swales can last indefinitely. The maintenance objectives for vegetated swale systems include keeping up the hydraulic and removal efficiency of the channel and maintaining a dense, healthy grass cover.

Maintenance activities should include periodic mowing (with grass never cut shorter than the design flow depth), weed control, watering during drought conditions, reseeding of bare areas, and clearing of debris and blockages. Cuttings should be removed from the channel and disposed in a local composting facility. Accumulated sediment should also be removed manually to avoid concentrated flows in the swale. The application of fertilizers and pesticides should be minimal.

Another aspect of a good maintenance plan is repairing damaged areas within a channel. For example, if the channel develops ruts or holes, it should be repaired utilizing a suitable soil that is properly tamped and seeded. The grass cover should be thick; if it is not, reseed as necessary. Any standing water removed during the maintenance operation must be disposed to a sanitary sewer at an approved discharge location. Residuals (e.g., silt, grass cuttings) must be disposed in accordance with local or State requirements. Maintenance of grassed swales mostly involves maintenance of the grass or wetland plant cover. Typical maintenance activities are summarized below:

- Inspect swales at least twice annually for erosion, damage to vegetation, and sediment and debris accumulation preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the swale is ready for winter. However, additional inspection after periods of heavy runoff is desirable. The swale should be checked for debris and litter, and areas of sediment accumulation.
- Grass height and mowing frequency may not have a large impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.
- Trash tends to accumulate in swale areas, particularly along highways. The need for litter removal is determined through periodic inspection, but litter should always be removed prior to mowing.
- Sediment accumulating near culverts and in channels should be removed when it builds up to 75 mm (3 in.) at any spot, or covers vegetation.
- Regularly inspect swales for pools of standing water. Swales can become a nuisance due to mosquito breeding in standing water if obstructions develop (e.g. debris accumulation, invasive vegetation) and/or if proper drainage slopes are not implemented and maintained.

Cost

Construction Cost

Little data is available to estimate the difference in cost between various swale designs. One study (SWRPC, 1991) estimated the construction cost of grassed channels at approximately $0.25 per ft^2. This price does not include design costs or contingencies. Brown and Schueler (1997) estimate these costs at approximately 32 percent of construction costs for most stormwater management practices. For swales, however, these costs would probably be significantly higher since the construction costs are so low compared with other practices. A more realistic estimate would be a total cost of approximately $0.50 per ft^2, which compares favorably with other stormwater management practices.

Table 2 Swale Cost Estimate (SEWRPC, 1991)

Component	Unit	Extent	Unit Cost			Total Cost		
			Low	Moderate	High	Low	Moderate	High
Mobilization / Demobilization-Light	Swale	1	$107	$274	$441	$107	$274	$441
Site Preparation								
Clearing[b]	Acre	0.5	$2,200	$3,800	$5,400	$1,100	$1,900	$2,700
Grubbing[c]	Acre	0.25	$3,800	$5,200	$6,600	$950	$1,300	$1,650
General Excavation[d]	Yd^3	372	$2.10	$3.70	$5.30	$781	$1,376	$1,972
Level and Till[e]	Yd^2	1,210	$0.20	$0.35	$0.50	$242	$424	$605
Sites Development								
Salvaged Topsoil Seed, and Mulch[f]	Yd^2	1,210	$0.40	$1.00	$1.60	$484	$1,210	$1,936
Sod[g]	Yd^2	1,210	$1.20	$2.40	$3.60	$1,452	$2,904	$4,356
Subtotal	--	--	--	--	--	$5,116	$9,388	$13,660
Contingencies	Swale	1	25%	25%	25%	$1,279	$2,347	$3,415
Total	--	--	--	--	--	$6,395	$11,735	$17,075

Source: (SEWRPC, 1991)

Note: Mobilization/demobilization refers to the organization and planning involved in establishing a vegetative swale.

[a] Swale has a bottom width of 1.0 foot, a top width of 10 feet with 1:3 side slopes, and a 1,000-foot length.

[b] Area cleared = (top width + 10 feet) x swale length.

[c] Area grubbed = (top width x swale length).

[d] Volume excavated = (0.67 x top width x swale depth) x swale length (parabolic cross-section).

[e] Area tilled = $\left(\text{top width} + \frac{8(\text{swale depth}^2)}{3(\text{top width})}\right) \times$ swale length (parabolic cross-section).

[f] Area seeded = area cleared x 0.5.

[g] Area sodded = area cleared x 0.5.

Table 3 Estimated Maintenance Costs (SEWRPC, 1991)

Component	Unit Cost	Swale Size (Depth and Top Width)		Comment
		1.5 Foot Depth, One-Foot Bottom Width, 10-Foot Top Width	3-Foot Depth, 3-Foot Bottom Width, 21-Foot Top Width	
Lawn Mowing	$0.85 / 1,000 ft²/ mowing	$0.14 / linear foot	$0.21 / linear foot	Lawn maintenance area=(top width + 10 feet) x length. Mow eight times per year
General Lawn Care	$9.00 / 1,000 ft²/ year	$0.18 / linear foot	$0.28 / linear foot	Lawn maintenance area = (top width + 10 feet) x length
Swale Debris and Litter Removal	$0.10 / linear foot / year	$0.10 / linear foot	$0.10 / linear foot	–
Grass Reseeding with Mulch and Fertilizer	$0.30 / yd²	$0.01 / linear foot	$0.01 / linear foot	Area revegetated equals 1% of lawn maintenance area per year
Program Administration and Swale Inspection	$0.15 / linear foot / year, plus $25 / inspection	$0.15 / linear foot	$0.15 / linear foot	Inspect four times per year
Total	--	$0.58 / linear foot	$ 0.75 / linear foot	--

Maintenance Cost

Caltrans (2002) estimated the expected annual maintenance cost for a swale with a tributary area of approximately 2 ha at approximately $2,700. Since almost all maintenance consists of mowing, the cost is fundamentally a function of the mowing frequency. Unit costs developed by SEWRPC are shown in Table 3. In many cases vegetated channels would be used to convey runoff and would require periodic mowing as well, so there may be little additional cost for the water quality component. Since essentially all the activities are related to vegetation management, no special training is required for maintenance personnel.

References and Sources of Additional Information

Barrett, Michael E., Walsh, Patrick M., Malina, Joseph F., Jr., Charbeneau, Randall J, 1998, "Performance of vegetative controls for treating highway runoff," *ASCE Journal of Environmental Engineering*, Vol. 124, No. 11, pp. 1121-1128.

Brown, W., and T. Schueler. 1997. *The Economics of Stormwater BMPs in the Mid-Atlantic Region*. Prepared for the Chesapeake Research Consortium, Edgewater, MD, by the Center for Watershed Protection, Ellicott City, MD.

Center for Watershed Protection (CWP). 1996. *Design of Stormwater Filtering Systems*. Prepared for the Chesapeake Research Consortium, Solomons, MD, and USEPA Region V, Chicago, IL, by the Center for Watershed Protection, Ellicott City, MD.

Colwell, Shanti R., Horner, Richard R., and Booth, Derek B., 2000. *Characterization of Performance Predictors and Evaluation of Mowing Practices in Biofiltration Swales*. Report to King County Land And Water Resources Division and others by Center for Urban Water Resources Management, Department of Civil and Environmental Engineering, University of Washington, Seattle, WA

Dorman, M.E., J. Hartigan, R.F. Steg, and T. Quasebarth. 1989. *Retention, Detention and Overland Flow for Pollutant Removal From Highway Stormwater Runoff. Vol. 1*. FHWA/RD 89/202. Federal Highway Administration, Washington, DC.

Goldberg. 1993. *Dayton Avenue Swale Biofiltration Study*. Seattle Engineering Department, Seattle, WA.

Harper, H. 1988. *Effects of Stormwater Management Systems on Groundwater Quality*. Prepared for Florida Department of Environmental Regulation, Tallahassee, FL, by Environmental Research and Design, Inc., Orlando, FL.

Kercher, W.C., J.C. Landon, and R. Massarelli. 1983. Grassy swales prove cost-effective for water pollution control. *Public Works*, 16: 53–55.

Koon, J. 1995. *Evaluation of Water Quality Ponds and Swales in the Issaquah/East Lake Sammamish Basins*. King County Surface Water Management, Seattle, WA, and Washington Department of Ecology, Olympia, WA.

Metzger, M. E., D. F. Messer, C. L. Beitia, C. M. Myers, and V. L. Kramer. 2002. The Dark Side Of Stormwater Runoff Management: Disease Vectors Associated With Structural BMPs. Stormwater 3(2): 24-39.Oakland, P.H. 1983. An evaluation of stormwater pollutant removal

through grassed swale treatment. In *Proceedings of the International Symposium of Urban Hydrology, Hydraulics and Sediment Control, Lexington, KY.* pp. 173–182.

Occoquan Watershed Monitoring Laboratory. 1983. Final Report: *Metropolitan Washington Urban Runoff Project.* Prepared for the Metropolitan Washington Council of Governments, Washington, DC, by the Occoquan Watershed Monitoring Laboratory, Manassas, VA.

Pitt, R., and J. McLean. 1986. *Toronto Area Watershed Management Strategy Study: Humber River Pilot Watershed Project.* Ontario Ministry of Environment, Toronto, ON.

Schueler, T. 1997. Comparative Pollutant Removal Capability of Urban BMPs: A reanalysis. *Watershed Protection Techniques* 2(2):379–383.

Seattle Metro and Washington Department of Ecology. 1992. *Biofiltration Swale Performance: Recommendations and Design Considerations.* Publication No. 657. Water Pollution Control Department, Seattle, WA.

Southeastern Wisconsin Regional Planning Commission (SWRPC). 1991. *Costs of Urban Nonpoint Source Water Pollution Control Measures.* Technical report no. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI.

U.S. EPA, 1999, Stormwater Fact Sheet: Vegetated Swales, Report # 832-F-99-006 http://www.epa.gov/owm/mtb/vegswale.pdf, Office of Water, Washington DC.

Wang, T., D. Spyridakis, B. Mar, and R. Horner. 1981. *Transport, Deposition and Control of Heavy Metals in Highway Runoff.* FHWA-WA-RD-39-10. University of Washington, Department of Civil Engineering, Seattle, WA.

Washington State Department of Transportation, 1995, *Highway Runoff Manual*, Washington State Department of Transportation, Olympia, Washington.

Welborn, C., and J. Veenhuis. 1987. *Effects of Runoff Controls on the Quantity and Quality of Urban Runoff in Two Locations in Austin, TX.* USGS Water Resources Investigations Report No. 87-4004. U.S. Geological Survey, Reston, VA.

Yousef, Y., M. Wanielista, H. Harper, D. Pearce, and R. Tolbert. 1985. *Best Management Practices: Removal of Highway Contaminants By Roadside Swales.* University of Central Florida and Florida Department of Transportation, Orlando, FL.

Yu, S., S. Barnes, and V. Gerde. 1993. *Testing of Best Management Practices for Controlling Highway Runoff.* FHWA/VA-93-R16. Virginia Transportation Research Council, Charlottesville, VA.

Information Resources

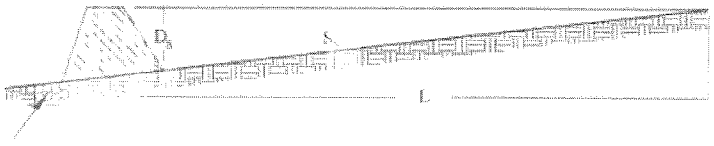
Maryland Department of the Environment (MDE). 2000. *Maryland Stormwater Design Manual.* www.mde.state.md.us/environment/wma/stormwatermanual. Accessed May 22, 2001.

Reeves, E. 1994. Performance and Condition of Biofilters in the Pacific Northwest. *Watershed Protection Techniques* 1(3):117–119.

Seattle Metro and Washington Department of Ecology. 1992. *Biofiltration Swale Performance.* Recommendations and Design Considerations. Publication No. 657. Seattle Metro and Washington Department of Ecology, Olympia, WA.

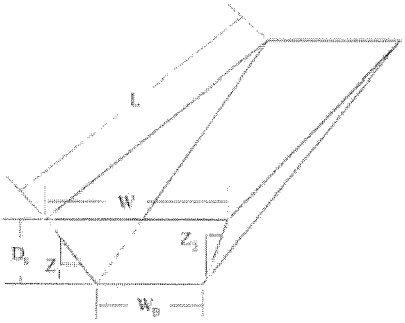
USEPA 1993. *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. EPA-840-B-92-002. U.S. Environmental Protection Agency, Office of Water. Washington, DC.

Watershed Management Institute (WMI). 1997. *Operation, Maintenance, and Management of Stormwater Management Systems*. Prepared for U.S. Environmental Protection Agency, Office of Water. Washington, DC, by the Watershed Management Institute, Ingleside, MD.



Provide for scour protection.

(a) Cross section of swale with check dam.



(b) Dimensional view of swale impoundment area.

Notation:
L = Length of swale impoundment area per check dam (ft)
D_S = Depth of check dam (ft)
S_S = Bottom slope of swale (ft/ft)
W = Top width of check dam (ft)
W_B = Bottom width of check dam (ft)
$Z_{1&2}$ = Ratio of horizontal to vertical change in swale side slope (ft/ft)

ATTACHMENT E

Geotechnical Certification Sheet

The design of stormwater treatment and other control measures proposed in this plan requiring specific soil infiltration characteristics and/or geological conditions has been reviewed and approved by a registered Civil Engineer, Geotechnical Engineer, or Geologist in the State of California.

N/A

_____ _____

Name Date

ATTACHMENT F

Maintenance Plan

I. The LID and treatment control BMP facilities are non-irrigated naturally vegetated swales in multiple locations throughout the site as shown on Attachment C.

II. Inspection for the BMP shall occur monthly from October 1st to May 1st each year as this coincides with the rainy season. The Operation and Maintenance Verification Form is attached. The self certification form shall be completed annually and mailed to the County of San Diego no later than October 15th each year. In addition, attached is a maintenance indicator and actions table to be utilized when making the annual inspections.

III. The responsibility of maintenance and submittal of forms are the future property owners of the land where the BMP is designated on Attachment C. If required by the County of San Diego during the parcel map process a maintenance agreement shall be executed by the current property owner and said agreement shall be placed in this document. Each owner shall maintain records of the self certification forms for a minimum of a 5-year period, except during the initial years.

PRIVATE TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE VERIFICATION FORM
BIOFILTER

1. Transcribe the following information from your notification letter and make corrections as necessary:

Permit No.: _____

BMP Location: _____

Responsible Party: _____

Phone Number: ( ) _____ ☐ *Check here for Phone Number Change*

Responsible Party Address: _____

Number Street Name & Suffix City/Zip

☐ *Check here for Address Change*

2. Using the Table below, please describe the inspections and maintenance activities that have been conducted during the last year, and date(s) maintenance was performed. Under "Results of Inspection," indicate whether maintenance was required based on each inspection, and if so, what type of maintenance. If maintenance was required, provide the date maintenance was conducted and description of the maintenance. Refer to the back of this sheet for information describing typical maintenance indicators and maintenance activities. If no maintenance was required based on the inspection results, state "no maintenance required."

Date of Inspection	Results of Inspection	Date Maintenance Completed and Description of Maintenance Conducted

3. Attach copies of available supporting documents (photographs, copies of maintenance contracts, and/or maintenance records).

4. Sign the bottom of the form and return to:

County of San Diego Watershed Protection Program
Treatment Control BMP Tracking
5201 Ruffin Road, Suite P, MS 0326
San Diego, CA 92123

Signature of Responsible Party **Print Name** **Date**

PRIVATE TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE VERIFICATION FORM
BIOFILTER

Biofilters Include:

☐ **Vegetated Filter Strip** ☐ **Vegetated Swale** ☐ **Bioretention Facility**

Routine maintenance is needed to ensure that flow is unobstructed, that erosion is prevented, and that soils are held together by plant roots and are biologically active. Typical maintenance consists of the following:

Bioretention BMPs Inspection and Maintenance Checklist	
Typical Maintenance Indicators	**Typical Maintenance Actions**
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation.
Poor vegetation establishment	Examine the vegetation to ensure that it is healthy and dense enough to provide filtering and to protect soils from erosion. Replenish mulch as necessary, remove fallen leaves and debris, prune large shrubs or trees, and mow turf areas.
Overgrown vegetation	Mow or trim as appropriate, but not less than the design height of the vegetation (typically 4-6 inches for grass). Confirm that irrigation is adequate and not excessive and that sprays do not directly enter overflow grates. Replace dead plants and remove noxious and invasive vegetation.
Erosion due to concentrated irrigation flow	Repair/re-seed eroded areas and adjust the irrigation system.
Erosion due to concentrated stormwater runoff flow	Repair/re-seed eroded areas and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or re-grading where necessary.
Standing water (BMP not draining)	Abate any potential vectors by filling holes in the ground in and around the biofilter facility and by insuring that there are no areas where water stands longer than 48 hours following a storm. If mosquito larvae are present and persistent, contact the San Diego County Vector Control Program at (858) 694-2888. Mosquito larvicides should be applied only when absolutely necessary and then only by a licensed individual or contractor.
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs, inlet, or outlet structures	Repair or replace as applicable.

ATTACHMENT G

Tracking Report

N/A

ATTACHMENT H

Addendum